APPLIED INFORMATION TECHNOLOGY AND COMPUTER SCIENCE
e-ISSN: 2773-5141

AITCS

Vol. 6 No. 1 (2025) 2201-2214
https://publisher.uthm.edu.my/periodicals/index.php/aitcs

Mah Heng Motor Enterprise Full Stack Management System

Luu Wei Chek[1], Mohd Zaki Mohd Salikon[1*]

[1] *Fakulti Sains Komputer dan Teknologi Maklumat,*
Universiti Tun Hussein Onn Malaysia, Parit Raja, Batu Pahat, 86400, MALAYSIA

*Corresponding Author: mdzaki@uthm.edu.my
DOI: https://doi.org/10.30880/aitcs.2025.06.01.123

Article Info

Received: 18 June 2024
Accepted: 17 June 2025
Available online: 30 June 2025

Keywords

Motorcycle, Stock, Sales Service, Sales Report

Abstract

Mah Heng Motor Enterprise is a company responsible for repairing and selling motor parts and accessories. For instance, sell tayar, oil, chain, light bulb, windscreen and so on. Currently, the existing database management process for Mah Heng Motor Enterprise still relies on manual processes and documentation to manage its business operation. However, there have several issues encountered in the existing system on managing the stocks and reports. In order to assist in overcoming these constraints, the suggested system will be developed. The public website, login page module, manage customer, manage supplier, invoice management, stock management, sales service, and generate report modules are the eight modules that make up the proposed system. This system using waterfall model methodology to develop. The proposed system will be written by HTML,CSS,JAVA SCRIPT and PHP programming language that running on the Visual Studio mechanisms and SQL server will be the database server. When the developed system is released, Mah Heng Motor Enterprise will be the target to participate in the user acceptance test (UAT). The expected outcome for the proposed system is able to resolve the issues for the existing system such as stock data well-organized and generate the sales report. It will help Mah Heng Motor Enterprise manages the stock information in proper way.

1. Introduction

In the ever-evolving corporate management landscape, Mah Heng Motor Enterprises has recognized the key role of technology in optimizing operational processes. Mah Heng Motor Enterprises recognizes the importance of efficient inventory management as it seeks to streamline processes and improve operational efficiency. Existing inventory management systems focus on solving problems that affect the overall management of inventory [1].

One of the main challenges faced by Mah Heng Motor Enterprise is the incomplete inventory list in the existing system. This is because the company's owner records inventory manually, either by hand or by collecting documents. The end effect is an inefficient inventory management process that negatively affects the company's ability to operate as a whole. Mah Heng Motor Enterprise has a thorough inventory management system that is specifically designed to address this problem. This innovative feature makes sure that every item in the inventory spectrum from accessories to spare parts is meticulously tracked and documented.

Mah Heng Motor Enterprise has introduced advanced reporting functionality, which is a significant improvement. This robust reporting system offers comprehensive insights into sales, purchases, and overall

transaction activities, surpassing the constraints of the current setup [2]. This feature is important because it provides the organization with real time data.

Mah Heng Motor Enterprise will also have a new feature that allows customers to schedule appointments online. This enables the shop to effectively manage time, guaranteeing customers can receive motor repairs in a shorter amount of time. Through an easy-to-use online booking system, customers can conveniently schedule their upcoming maintenance appointments. This feature could greatly improve the shop's operational efficiency by giving customers a simple and convenient way to plan and handle their motor maintenance needs [3].

2. Related Work

The proposed system and the current system utilised by the Mah Heng Motor Enterprise will be briefly explained in this chapter's literature review. Determining the shortcomings and strengths of the current systems requires research and analysis of three existing systems to compare with the developed system. Gathering helpful data facilitates the generation of creative concepts for creating an effective and all-encompassing management system.

2.1 Domain Background

Mah Heng Motor Enterprise is a motorcycle repair company based in Skudai, Johor Bahru, Malaysia. This company manages by its owner, who also acts as the sole technician. The day-to-day activities of Mah Heng Motor Enterprise include answering customer inquiries, offering technical advice on necessary repairs, performing diagnostics and inspections of motorcycles, providing services such as regular repair and maintenance tasks to the customers, dealing with suppliers to order necessary components and handling financial records. In order to improve the business operation of Mah Heng Motor Enterprise, it is very important for data storage and keeping for future purposes.

To solve these problems, our proposed solution is to develop a system called Mah Heng Enterprise Management System. The system emphasizes on providing a platform to manage data storage such as customer details, services, component stock and invoices. Through this system, it will streamline current business processes and convert manual data entry and retrieval into digital form, thus optimizing Mah Heng Motor Enterprise's business operations. This improves data accuracy and allows you to focus more on providing high-quality services to customers. Therefore, it increases overall efficiency.

2.2 Study of Related Existing Systems

2.2.1 Existing System 1: Xero Accounting Software

Xero is an elegant and full of features accounting program designed for small and medium-sized businesses. The accounting program Xero is subscribed to by more than 2 million businesses. It offered incredibly trustworthy data, safe data security, and astute online accounting. Xero accounting software consists of several useful modules and features such as invoicing, bank connection, information security, inventory, bank reconciliation, pay bills, mobile app, dashboard, Xero expenses, projects, quotes, purchase orders, fixed assets, reporting, sales tax and others.

2.2.2 Existing System 2: Appointy

Appointy is a multi-functional scheduling software that allows customers to book appointments with businesses through a simple booking process. Appointy also has the benefit of allowing businesses to know more about their customers, such as Group customers automatically, Focus on right customers, and more. Customer history and Intelligent CRM Tools.

2.2.3 Existing System 3: Finale Inventory

Finale Inventory is an easy-to-use inventory system designed primarily for small and medium-sized enterprises, including supermarkets, retailers, logistics companies, and so forth. This inventory system fulfils the requirement for the company management from different aspects such as warehouse management system, order management system and stock control.

2.3 Proposed System: Mah Heng Motor Enterprise Management System

The Mah Heng Motor Enterprise repair centre is the target user of the proposed management system. Stock audit history, transactions, and available stock are all managed via the management system. Selling and repairing motor parts generates the Mah Heng Motor Enterprise's daily revenue. The proposed system has eight modules which are the public website, login module, stock management module, sales service module, customer information module, supplier information module, invoice management module and generate report module. On the public website, customers can make an appointment to have their motor repaired, which allows the company to better arrange time to help customers who already have an appointment to have their motor repaired. For the login module, the admin needs to login into the account by inserting the correct username and password to access the system. After login into the account, the admin able to register the new user account for them to access the system.

Table 2.1: Comparison between three existing systems with proposed system

Features/System	Xero Accounting Software	Appionty	Finale Inventory	Mah Heng Motor Management System
Booking System	X	√	X	√
Login	√	√	√	√
Stock Management	X	X	√	√
Sales Service	X	X	√	√
Customer Information	√	X	X	√
Supplier Information	√	X	X	√
Sales Report	√	X	X	√

3. System Methodology

This chapter provides an explanation of the waterfall model that was employed in the system's development. This chapter will go into additional detail on the tasks associated with each waterfall model phase.

3.1 Waterfall Model

The earliest software development life cycle (SDLC) model was created by Winston Royce in 1970 and is referred to as the waterfall model. The SDLC is made up of a number of steps that must be followed in order to create a thorough or high-quality system. Plan, analyses, design, implement, test, and deploy is the six-step waterfall model, which is one of the types of software development life cycle [4]. The output of one phase will become the input for the next phase which means it needs to finish one phase before the next phase begins by following the sequential. There is not allow any overlapping action happened in each of the phases in the waterfall model. Each of the phases delivers different tasks and objectives to ensure that the project's outcome meets the demands. Figure3.1 shows the waterfall model.

3.2 System Development Workflow

The system is developed in five stages, including planning, analyzing, designing, implementing and deploying. Before moving on to the next phase, there are tasks that must be completed in each phase. The table 3.1 shows the process for each of the activities in the phases. Some of the activities need development tools to complete.

Table 3.1: Software development activities and their task

Phase	Activity	Process	Development Tool
Planning	➢ Collecting data ➢ Choosing the suggested system ➢ Establishing the project timetable and methodology	➢ Conduct a portion of interviews with the intended company ➢ Gantt chart	➢ Microsoft Project
Analysis	➢ Identify the current system and examine the limitations ➢ Analyze the system module ➢ Analyze the system flow ➢ Analyze the functional requirement and non-functional requirement	➢ List the functional requirement and non-functional requirement. ➢ Flowchart ➢ Context diagram ➢ DFD ➢ ERD	

System design	➢ Design user interface ➢ Design the public website ➢ Design database management system	➢ System architecture ➢ Database schema & data dictionaries ➢ User interface design	➢ DRAW.IO
Implementation	➢ Write coding ➢ Create the database and establish a connection with the system.	➢ Develop the system's database and apply the source code.	➢ Visual Studio ➢ Xampp
Deployment	➢ Release the system		

4. Analysis and Design

This chapter describes the results of the analysis and design phase of the development of the Mah Heng Motor Enterprise Management System.

4.1 System Requirement Analysis

An essential step in enumerating the system functions that meet user expectations is requirement analysis [5]. The requirement analysis must be logical and consistent with the design of the system flow. Functional requirement analysis and non-functional requirement analysis are two examples of requirement analysis types.

4.1.1 Functional Requirement and Non-Functional Requirement

The functional requirement analysis describes the system performance deeply. There have the different functions for each of the modules and the functions need to perform well to cater with the user's expectation. Table 4.1 shows the functional requirement analysis for the proposed system.

Table 4.1: Functional requirements.

No	Functional requirement	Description
1	Login function	• System should allow user able to login for accessing into the system.
2	Login authentication function	• System should be able to verify the existing user or the strange user account by indicating system login success or fail.
3	Update information function	• System should allow admin able to update the information of stock. • System should allow admin able to update the information of customer and supplier. • System should allow user able to update the information of sales order. • System should allow user able to update the information of sales services.
4	Delete function	• System should allow admin able to delete the items from the stock list.
5	Create function	• System should allow admin able to create the new items. • System should allow admin able to create the new customer and supplier. • System should allow admin able to create the sales services.
6	Search function	• System should allow admin able to search the items, customer and supplier by inserting the exact name.
7	Read function	• System should allow admin able to read stock list. • System should allow admin able to read customer and supplier list. • System should allow admin able to read the sales report. • System should allow admin able to read sales services and the details of each services.

The non-functional requirement analysis focus on the quality of the system from different aspect such as effectiveness, security, availability and so on. We can judge the user expectation according to their satisfaction.

Applied Information Technology and Computer Science Vol. 6 No. 1 (2025) p. 2201-2214

The higher user satisfies with the proposed system, the higher quality of the proposed system. Table 4.2 shows the non-functional requirement analysis for the proposed system.

Table 4.2: Non-functional requirements.

No	Requirement	Description
1	Performance	The system function must be available to use after user accessing into the system such as create, read, update and delete function.
2	Operational	The system is accessible to use for the users 24 hours per day.
3	Security	The unauthorized access will be identified in the login session.
4	Cultural and political	The system must be easy and simple to use for the admin.

4.1.2 User Requirement Analysis

For interactive systems to be successful, it is essential that users' needs be understood at every stage of the information systems design process [6]. The table 4.3 shows the user requirements.

Table 4.3: User requirements.

No	Requirement
1.	Administrator must have an account with valid username and password.
2.	Administrators should be able to create new items.
3.	Administrators should be able to create new sales services.
4.	Administrators should be able to create new customers.
5.	Administrators should be able to create new suppliers.
6.	Administrators should be able to create new invoices.
7.	Administrators should be able to generate reports.
8.	Administrators should be able to see existing stocks

4.2 System Analysis

System analysis is a crucial method for studying the transformation of solar energy in individual ecosystem blocks [7]. It is also an innovative tool for decision-making mechanisms in modern management and management, where it is used to study decision-making procedures and the organization of complex systems [8]. In the context of production safety in erratic systems, system analysis is essential for considering a wide range of elements, factors, and conditions [9]. Lastly, in the study of complex structured systems, system analysis is used to separate the system from the environment and ensure the optimality of decisions [10].

4.2.1 Context Diagram

Figure 4.1 has shown the context diagram that illustrate for Mah Heng Motor enterprise management system. Data flow diagrams under level 0 include context diagrams. The context diagram is structured by three elements: the data flow line, the external entity, and the process system. The external entities are administrator and customer. There indicate a lot of the input and output flow line between the process system and the external entities for exchanging and processing the system's information.

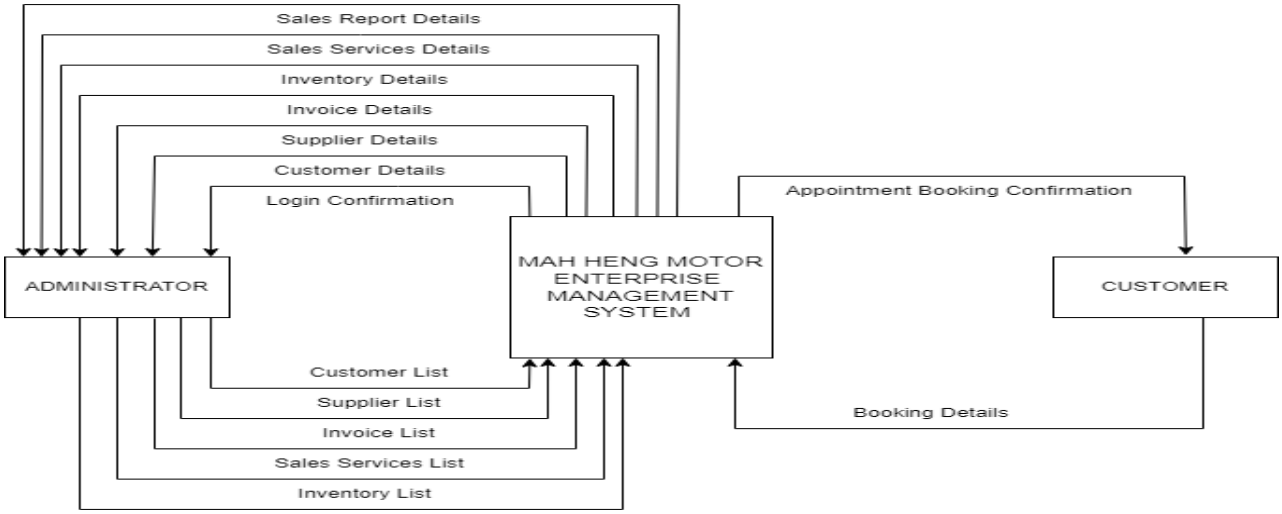


Figure 4.1: Context Diagram

4.2.2 Data Flow Diagram Level 0

Figure 4.2 shows the data flow diagram level 0 for the Mah Heng motor enterprise management system. There are two external entities in this data flow diagram. Eight data stores and eight processes. Every process and data storage has a numbering ID label that corresponds to a sequential numbering system.

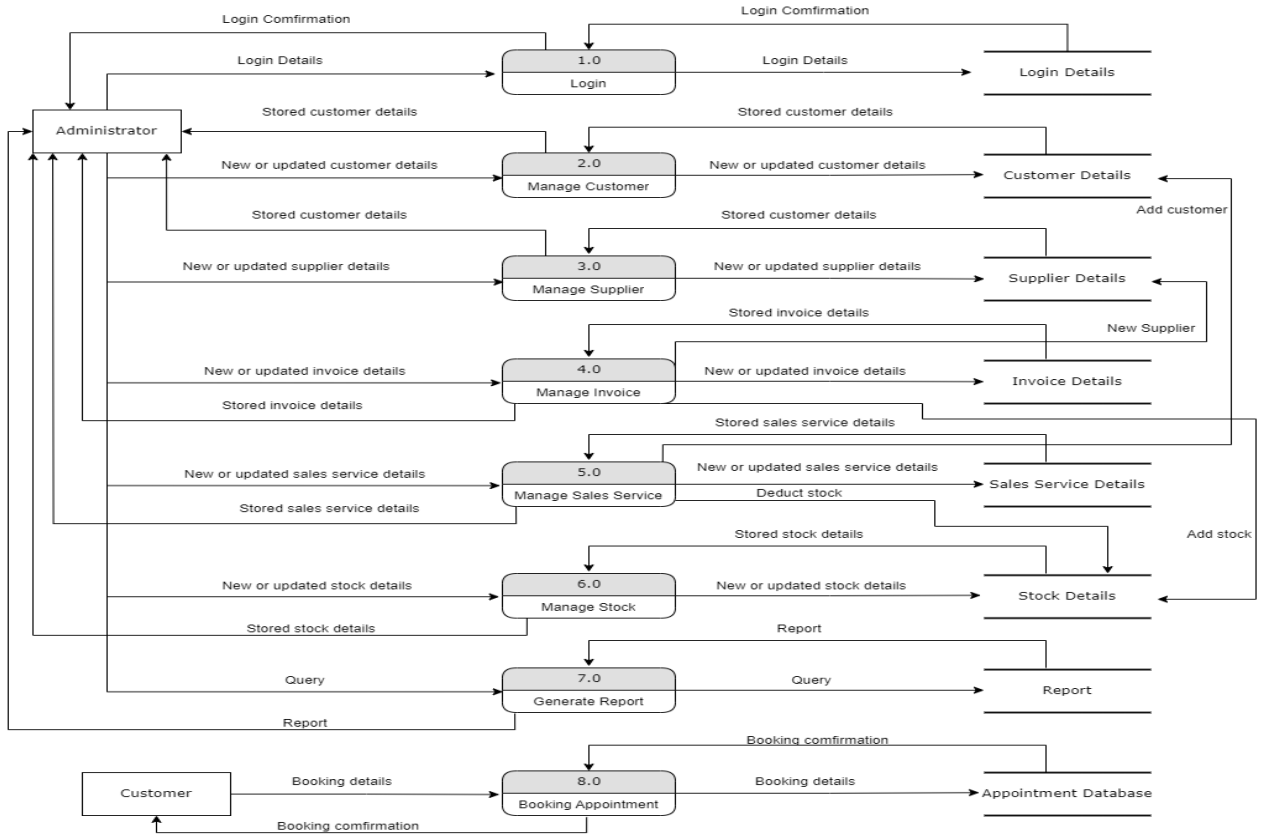
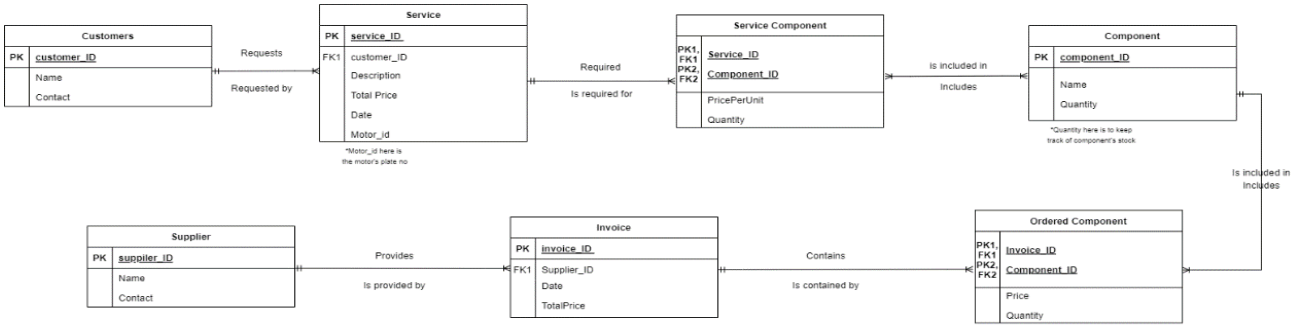


Figure 4.2: Data Flow Diagram Level 0

4.2.3 Entity Relationship Diagram

Entity-relationship modeling is a widely-used technique for specifying software systems, particularly databases [11]. This approach allows for the clear and comprehensive representation of entities, their attributes, and the relationships between them. The figure 4.3 shows the ERD design for the Mah Heng motor enterprise management system.

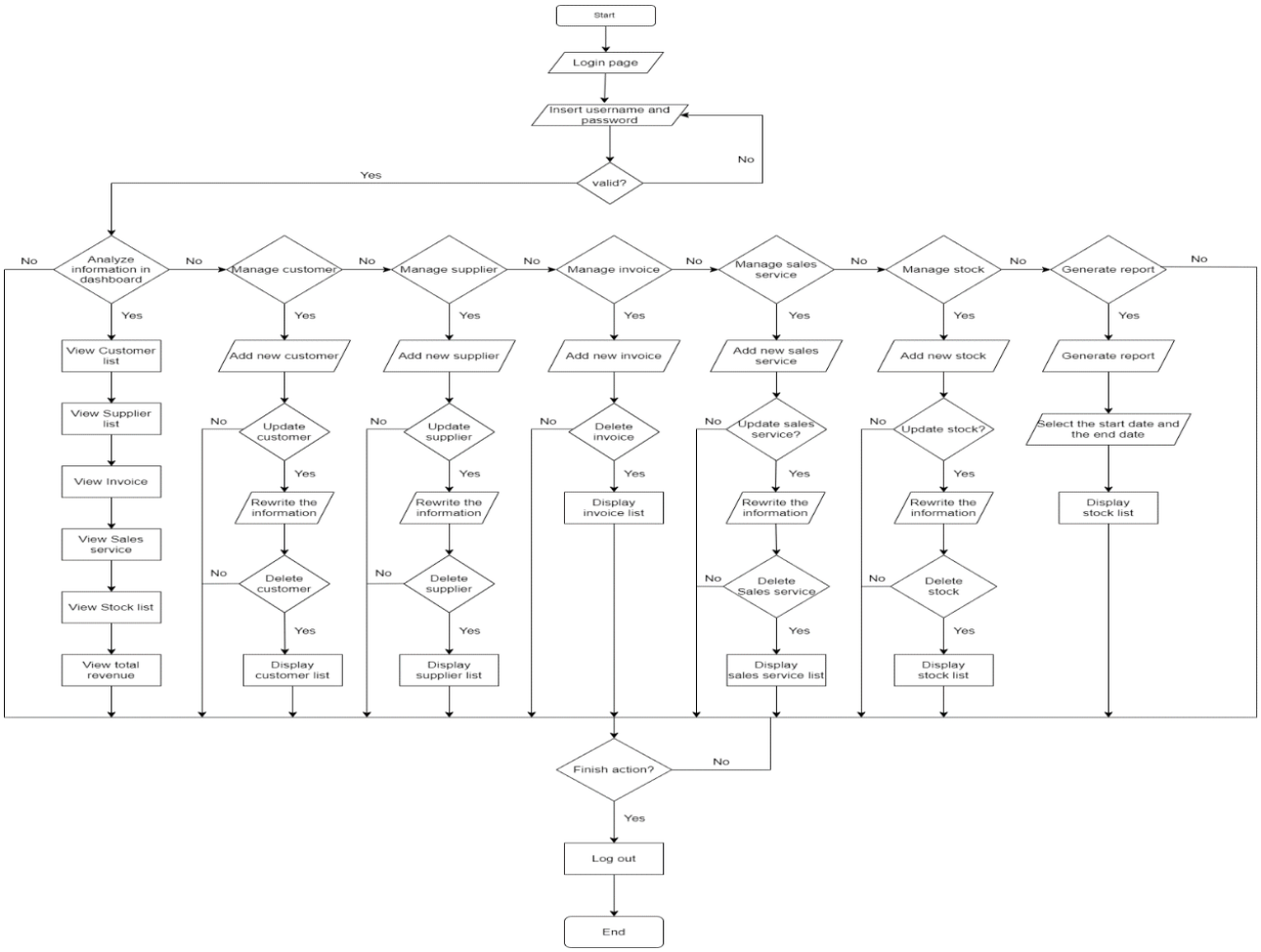
Applied Information Technology and Computer Science Vol. 6 No. 1 (2025) p. 2201-2214



Figuer 4.3: Entity Relationship Diagram

4.2.4 Flowchart

Flowchart is an essential illustration that used for demonstrating and modelling the process of the system. Each of the process will be clearly defined step-by-step follow the sequential. It is required to clarify the comprehensive process before starting develop the proposed system. Figure 4.4 has shown the flowchart that illustrate for the admin in the Mah Heng Motor Enterprise management system.



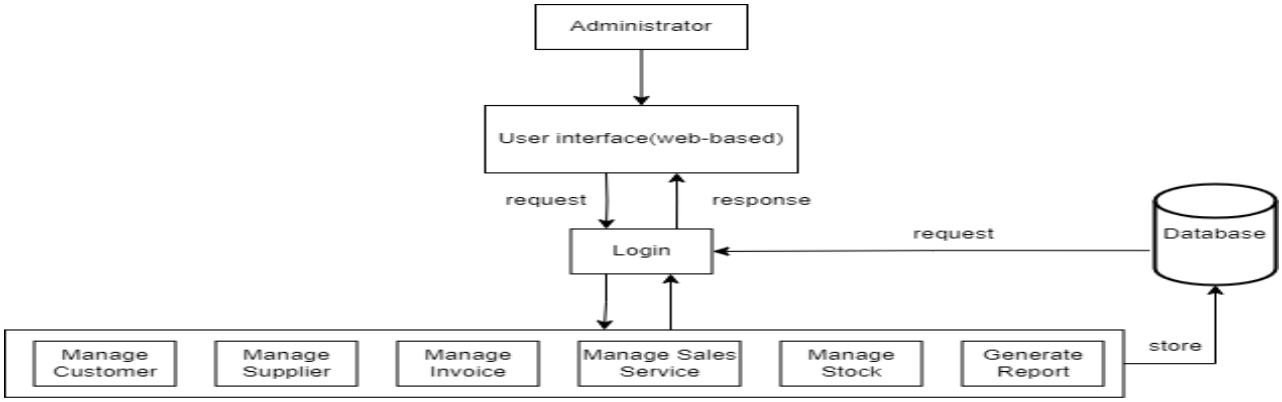
Figuer 4.4: Flowchart

4.3 System Design

The interface, database, and architecture of a system will be created using the Flowchart, Entity Relationship Diagram, and Data Flow Diagrams generated during the analysis phase. The designs generated during the design stage will be used to develop the system.

4.3.1 System Architecture

The general architecture of a system is a representation of the structures that are involved in its design. It shows the relationship between the various components and submodules of the system.Figure 4.5 shows the system architecture of the Mah Heng Motor Enterprise Management System. The system architecture for a web-based inventory management system involves a step-by-step design to enhance operational efficiency.



Figuer 4.5: System architecture

4.4 Implementation

In this session, it will show the segment code, user interface and functionality of the inventory management system. The system use the Visual Studio and XAMPP to develop.

4.4.1 Login Module

For figure 4.6 show the interface for login module and also admin need to insert the valid username and password to login the system.

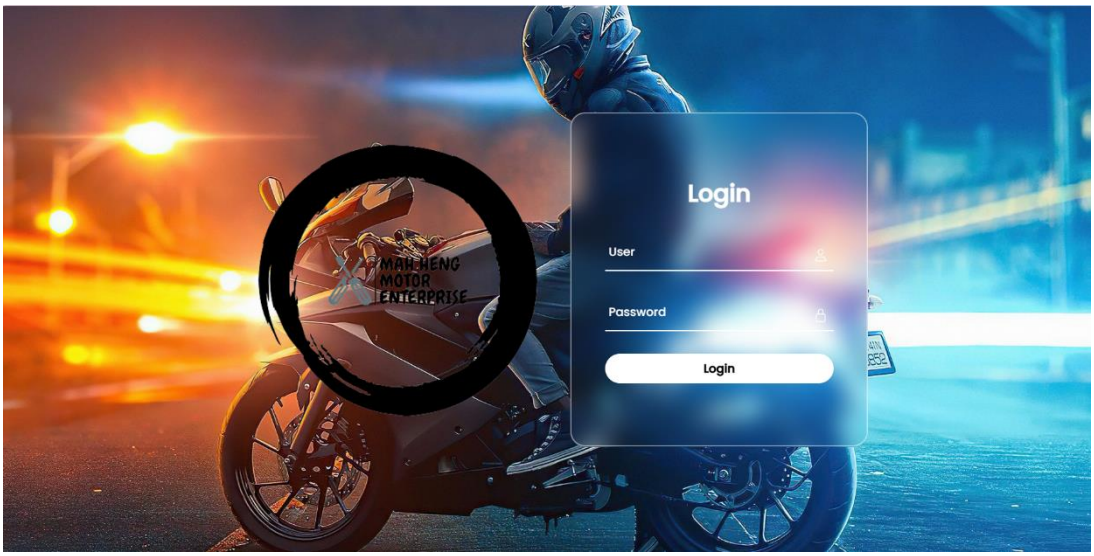


Figure 4.6: Login Module Interface

4.4.2 Sales Management Module

For figure 4.8 and figure 4.9 show the module can add, update and delete the sales details and also admin able to view the all sales information in the sales module.

Applied Information Technology and Computer Science Vol. 6 No. 1 (2025) p. 2201-2214

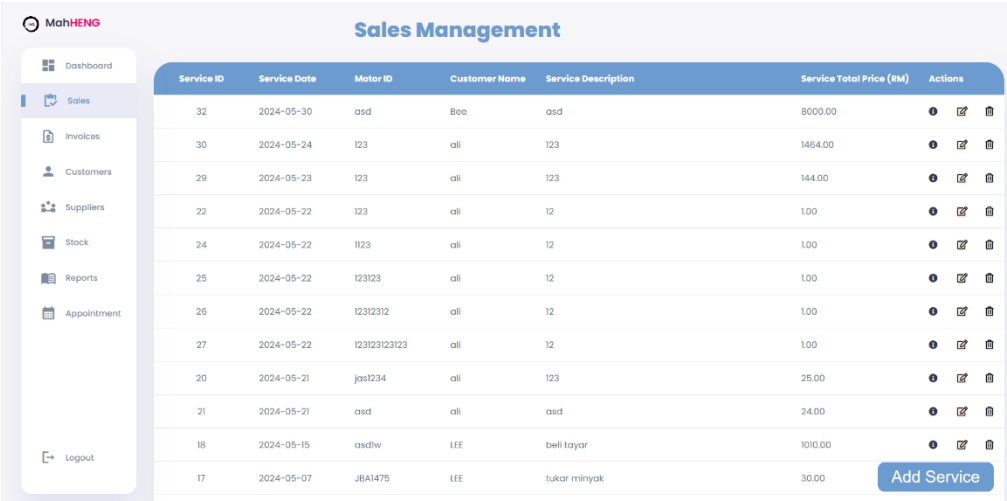


Figure 4.8: Interface for the Sales Management Module

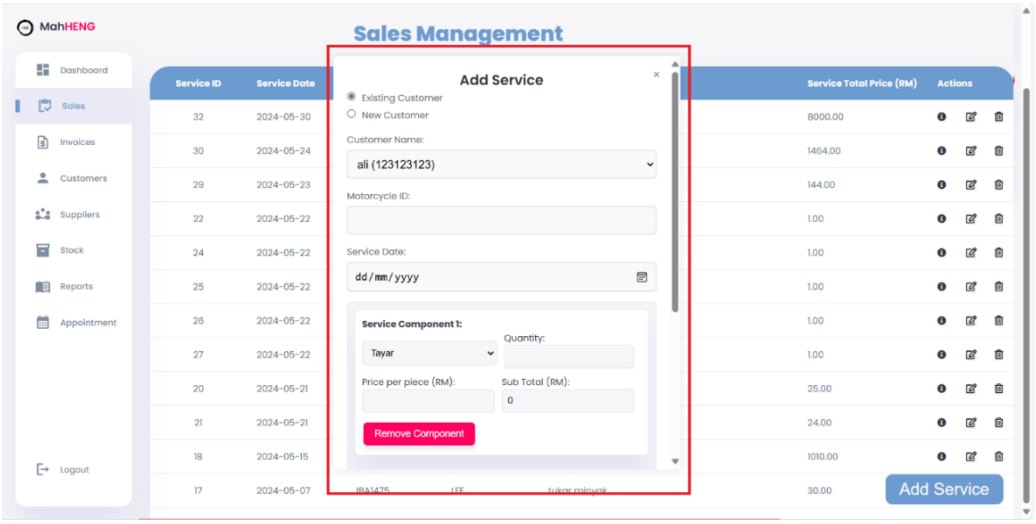


Figure 4.9: Add the new sales service

4.4.3 Invoices Management Module

For figure 4.10 and 4.11 show the module can add, update and delete the invoices details and also admin able to view the all invoices information in the invoices module.

Figure 4.10: Interface for Invoices Management Module

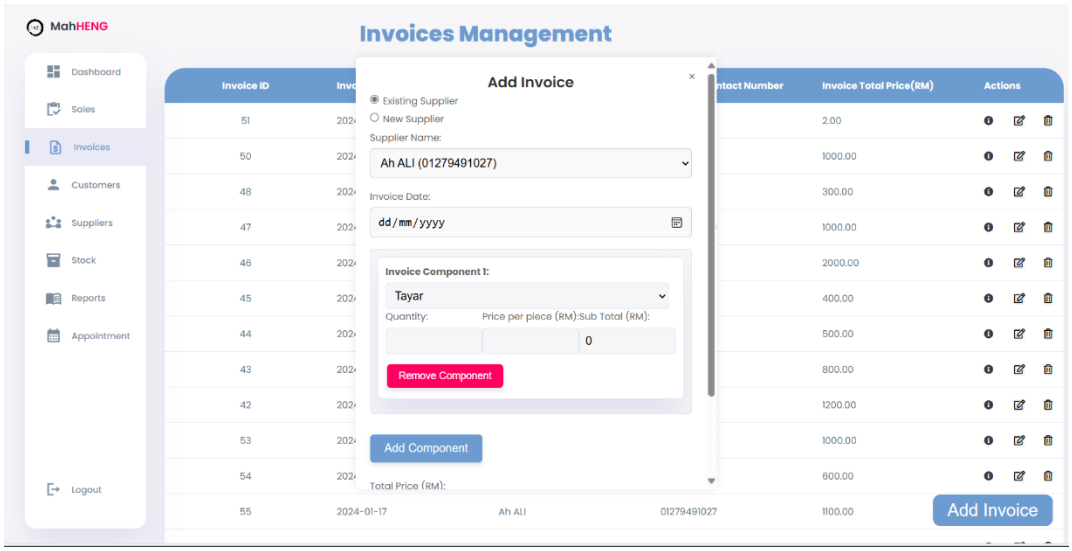


Figure 4.11: Add the new invocies

4.4.4 Customer Module

Figure 4.12 show the customer module can view, update and delete the customer. The customer list, including customer id, name, and contact number.

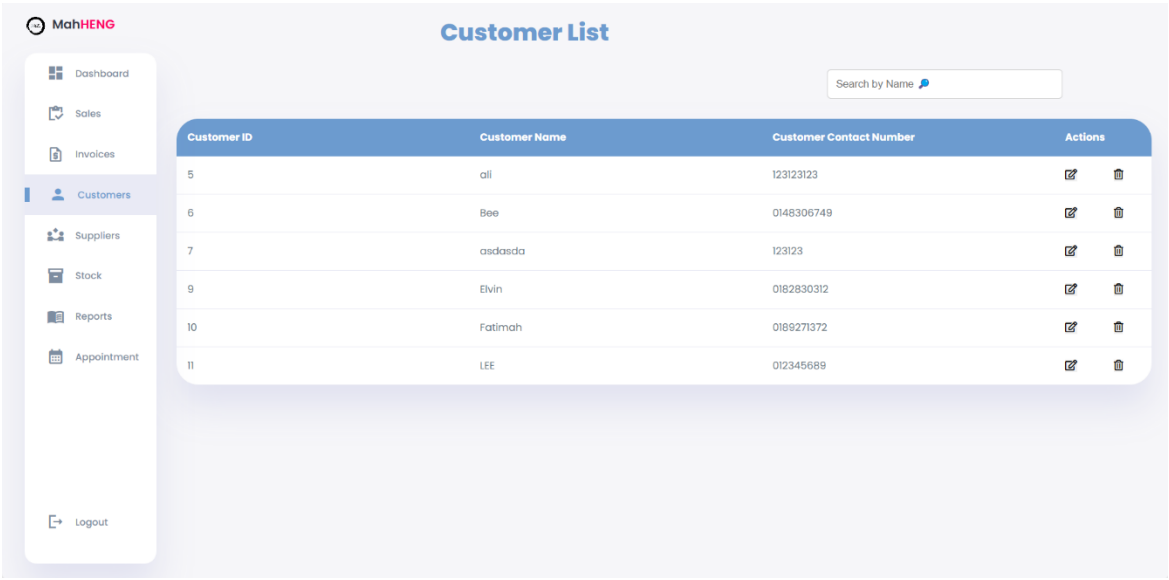


Figure 4.12: Interface for Customer Module

4.4.5 Supplier Module

For figure 4.13 show the supplier module can view, update and delete the supplier. The supplier list, including supplier id, name, and contact number.

Applied Information Technology and Computer Science Vol. 6 No. 1 (2025) p. 2201-2214

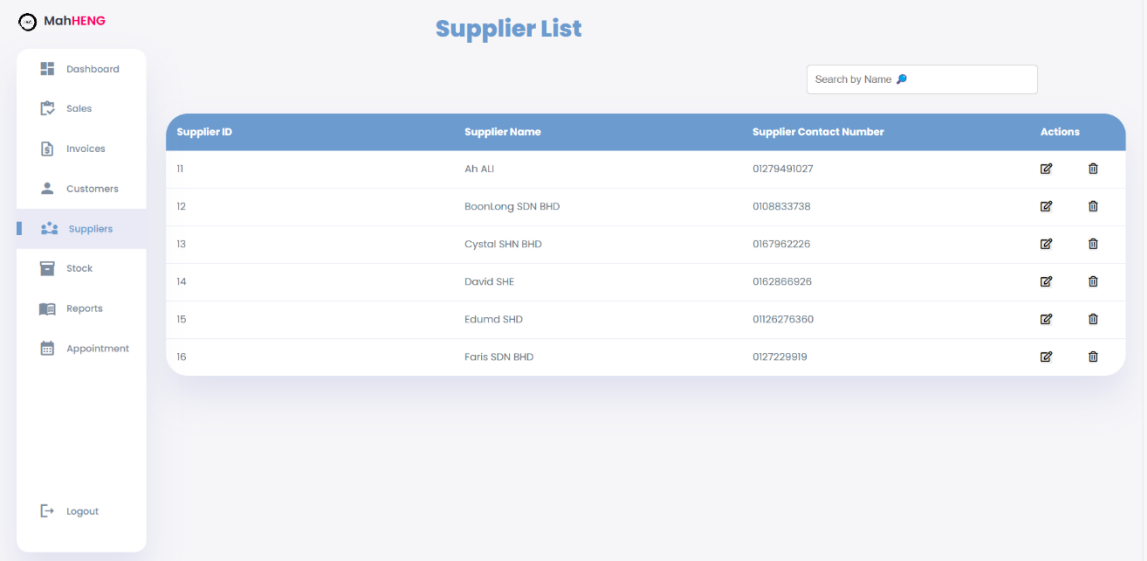


Figure 4.13: Interface for Supplier Module

4.4.6 Stock Module

For figure 4.14 show the stock module can update and delete the component.

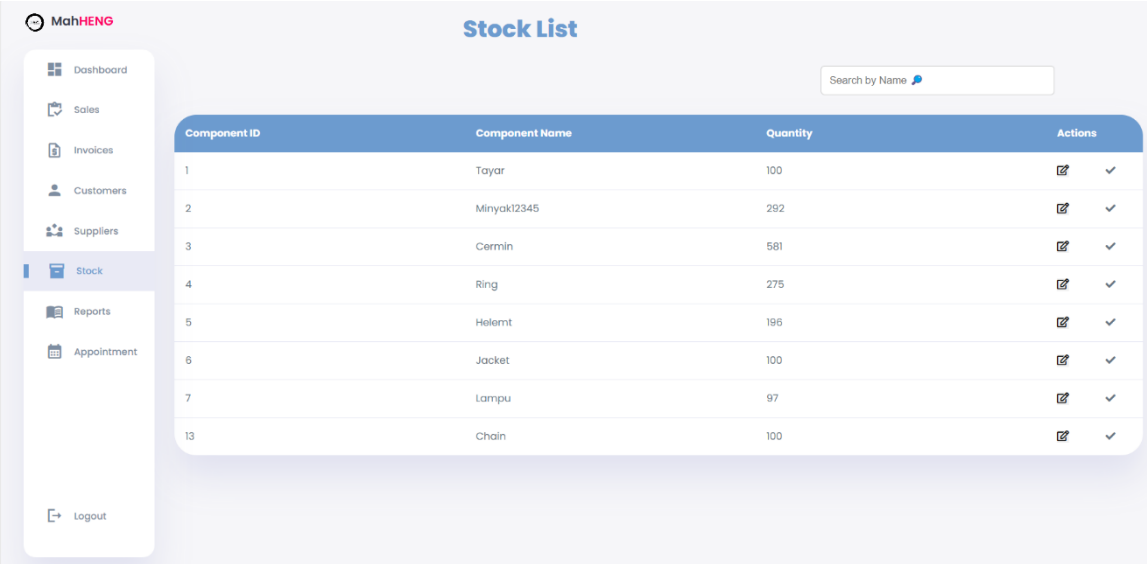


Figure 4.14: Interface for Stock Module

4.4.7 Report Module

For figure 4.15 show the report module can select the start date and end date for the invoice report or sales report

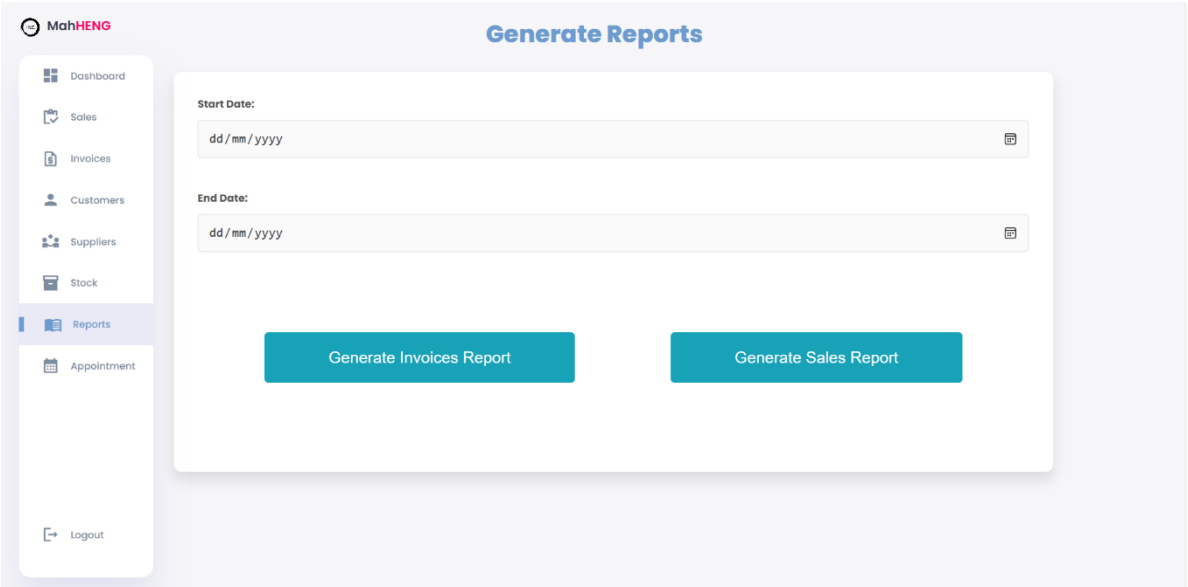


Figure 4.15: Interface for the Report Module

4.4.8 Appointment Module

For figure 4.16 show the user can booking appointment at public website. For figure 4.17 show the admin can view the details for the user booking.

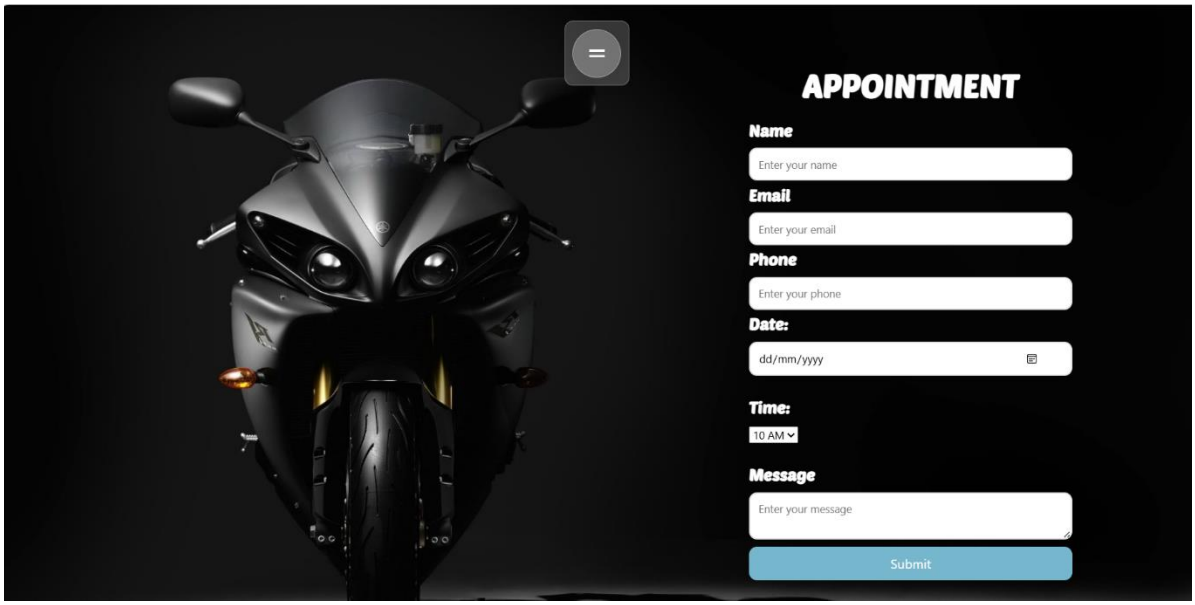


Figure 4.16: Interface for the Booking Website

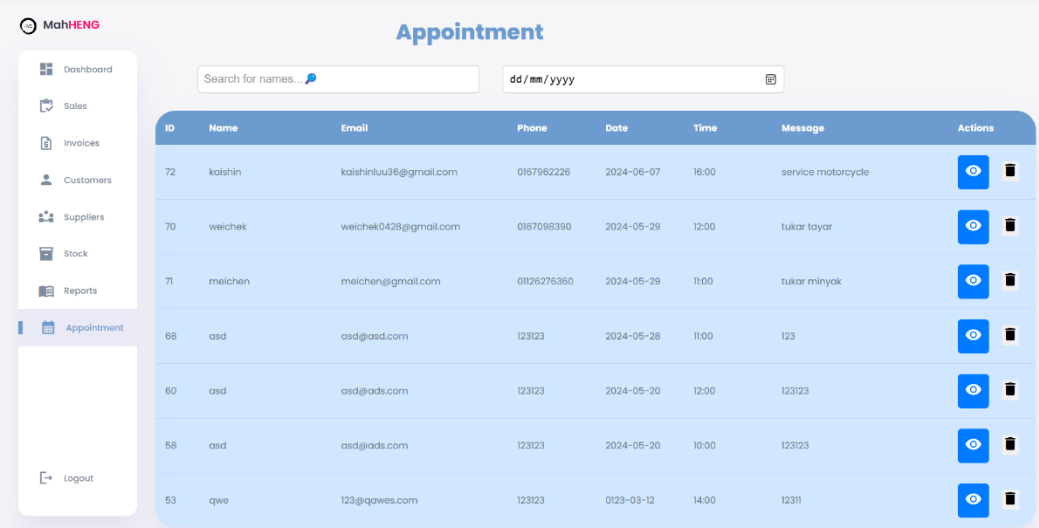


Figure 4.17: Interface for the Appointment Module

4.5 User Acceptance Testing

The user acceptance testing form of inventory management system will be done by the owner of Mah Heng Motor Enterprise. For table 4.4 show the user acceptance testing form.

Table 4.4: User Acceptance Testing

Testing Modules	Testing	Expected Results	Actual Results
User login	Admin insert the username and password	Admin can able to access into the management system.	Pass
Sales Module	Admin can add new sales by fill the information for sales service	Displayed the new sales information in the table list.	Pass
	Admin can update the sales information	Displayed the updated sales information in the sales table list	Pass
	Admin can delete certain sales	Displayed the newest sales list	Pass
Invoices Module	Admin can add new invoices by fill the information for invoices	Displayed the new invoices information in the table list.	Pass
	Admin can update the invoices information	Displayed the updated invoices information in the invoices table list	Pass
	Admin can delete certain invoices	Displayed the newest invoices list	Pass
Customer Module	Admin can update the customer name and phone number	Displayed the updated customer information in the customer table list	Pass
	Admin can delete certain customer	Displayed the newest customer list	Pass
Supplier Module	Admin can update the supplier name and phone number	Displayed the updated supplier information in the supplier table list	Pass
	Admin can delete certain supplier	Displayed the newest supplier list	Pass
Stock Module	Admin can update the component name	Displayed the updated stock information in the stock table list	Pass
	Admin can delete certain stock	Displayed the newest stock list	Pass
Report Module	Admin can generate invoice report	Displayed the invoice report	Pass
	Admin can generate sales report	Displayed the sales report	Pass
Appointment Module	User can booking appointment in public website	Displayed the user booking appointment details in appointment module	Pass

5. Conclusion

The project's goals have been met, and the user requests have been satisfied with the produced management system. The public website, login module, customer management module, supplier management module, invoice management module, sales service module, report module, and manage stock module are among the eight successfully built modules of this system. The present system's issues, such the ability to save all details in a database, have been fixed by this one. Without wasting time on paper records or calculations of the entire sales profit, this method can assist the user in effectively managing their stock and sales service. The system result shows numerous advantages that, from a business standpoint, could benefit the client. The user acceptability testing indicates that the client is happy with the features of the system. Though there is still room for improvement, the author hopes the client's company can get a good value by using this developed system. There might be a chance in the future to upgrade and change this system to something more sophisticated.

Acknowledgement

The authors would like to thank the Faculty of Computer Science and Information Technology, Universiti Tun Hussein Onn Malaysia for its support.

Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

Author Contribution

The author confirms sole responsibility for the following: study conception and design, data collection, analysis and interpretation of results, and manuscript preparation.

References

[1] de Vries, J. (2007). Diagnosing inventory management systems: An empirical evaluation of a conceptual approach. International Journal of Production Economics, 108(1-2), 63-73.
[2] Berry, L. L., & Parasuraman, A. (2004). *Marketing services: Competing through quality*. Simon and Schuster.
[3] Smith, R., & Hawkins, B. (2004). Lean maintenance: reduce costs, improve quality, and increase market share. Elsevier.
[4] Petersen, K., Wohlin, C., & Baca, D. (2009). The waterfall model in large-scale development. In Product-Focused Software Process Improvement: 10th International Conference, PROFES 2009, Oulu, Finland, June 15-17, 2009. Proceedings 10 (pp. 386-400). Springer Berlin Heidelberg.
[5] Bahill, A. T., Madni, A. M., Bahill, A. T., & Madni, A. M. (2017). Discovering system requirements. Tradeoff Decisions in System Design, 373-457.
[6] Maguire, M., & Bevan, N. (2002, August). User requirements analysis: a review of supporting methods. In IFIP World Computer Congress, TC 13 (pp. 133-148). Boston, MA: Springer US.
[7] Mammadov, G., & Samadov, P. (2022). SYSTEM ANALYSIS, AN IMPORTANT METHOD FOR STUDYING THE TRANSFORMATION OF SOLAR ENERGY FOR INDIVIDUAL ECOSYSTEM BLOCKS. InterConf.
[8] Konyusheva, O.N. (2021). SYSTEM ANALYSIS AS AN INNOVATIVE TOOL FOR THE DEVELOPMENT OF DECISION-MAKING MECHANISMS IN MODERN MANAGEMENT AND MANAGEMENT.
[9] Puzyrev, N.M., Martynov, D.V., & Puzyrev, N.B. (2020). SYSTEM ANALYSIS IN SOLVING THE PROBLEMS OF PRODUCTION SAFETY IN ERGATIC SYSTEMS.
[10] Zaytsev, S.V. (2022). SYSTEM ANALYSIS IN THE STUDY OF COMPLEX STRUCTURED SYSTEMS. EKONOMIKA I UPRAVLENIE: PROBLEMY, RESHENIYA.
[11] Nikiforova, O., & Pavlova, N. (2010). Foundations on generation of relationships between classes based on initial business knowledge. Information Systems Development: Towards a Service Provision Society, 289-297.